Having thus described the preferred embodiment, the invention is now claimed to be:

1. An assembly comprising:

an x-ray tube **(1)** including:

an envelope **(14)** which defines an evacuated chamber in which x-rays are generated **(12)**;

a housing **(30)** which surrounds at least a portion of the envelope;

a cooling system **(32, 32′)** which circulates a coolant through the housing to remove heat from the x-ray tube, the cooling system including:

a pump(**40, 40′**); and

a flow sensor system **(60, 60′)** which is responsive to a pressure difference across the pump.

2. The assembly of claim 1, wherein the flow sensor system includes a differential pressure transducer **(60, 60′)**.

3. The assembly of claim 1, wherein the cooling system **(32, 32′)** further includes:

a recirculating fluid flow path **(33, 33′)** including a first fluid line **(34, 34′)** which connects the housing **(30)** with an upstream end of the pump **(40, 40′)** and a second fluid line **(50, 50′ 36, 36′)** which connects a downstream end of the pump with the housing, the flow sensor system being responsive to a pressure difference between the first fluid line and the second fluid line.

4. The assembly of claim 1, wherein the flow sensor system detects a first pressure upstream of the pump and a second pressure downstream of the pump.

5. The assembly of claim 1, further including a processor **(80, 80′)** which receives a signal from the flow sensor system correlated with the pressure difference, the processor determining a flow rate of cooling fluid therefrom.

6. The assembly of claim 5, further including:

a control means **(81, 81′ , 82, 82′ , 107)**, the control means controlling operation of the x-ray tube in the event that the determined flow rate is below a preselected minimum level.

7. The assembly of claim 5, further including:

a control means **(81, 81′ , 82, 82′ , 107)** responsive to the pressure difference controlling at least one of:

operating power of the x-ray tube;

operating time of the x-ray tube;

selectable scan protocols; and

a cooling period prior to subsequent operating of the x-ray tube.

8. The assembly of claim 1, further including:

a temperature sensor **(90, 92)** which senses a temperature of circulating coolant in at least one of the housing and the cooling system.

9. The assembly of claim 8, further including:

a processor **(80′)** which receives signals from the temperature sensor **(90, 92)** and flow sensor system **(60′)** and determines an indication of thermal loading or remaining thermal capacity of the cooling system.

10. The assembly of claim 9, wherein the processor **(80′)** determines a cooling period, based on the determined indication, x-ray tube power, operating time, and duty cycle of a planned scan protocol to ensure that the x-ray tube is capable of performing the planned protocol without overheating.

11. A CT-scanner **(100)** including the assembly of **claim 1**.

12. A CT-scanner **(100)** comprising:

the assembly of **claim 1**;

an x-ray detector;

a scan processor; and

a display.

13. A method for controlling operation of an x-ray tube **(1)**, the method comprising:

circulating a cooling fluid through a housing **(30)** and over the x-ray tube with a pump **(40)**;

removing heat from the cooling fluid which has circulated through the housing; and

determining a flow rate of the cooling fluid, including:

determining a pressure difference across the pump or a function which correlates with the pressure difference, and

determining the flow rate from the pressure difference or function.

14. The method of claim 13, further including:

in the event that the flow rate drops below a predetermined minimum value, reducing power to the x-ray tube.

15. The method of claim 13, further including:

determining a temperature of the cooling fluid.

16. The method of claim 15, further including:

determining a temperature difference.

17. The method of claim 15, further including:

determining a thermal loading condition of the x-ray tube from the determined temperature and flow rate.

18. The method of claim 17, further including:

in response to the determined thermal loading condition, controlling at least one of:

operating power of the x-ray tube;

operating time of the x-ray tube;

selectable scan protocols; and,

a cooling time prior to subsequent operating of the x-ray tube.

19. A system for removing heat from an associated x-ray tube **(1)** comprising:

a fluid flow path **(33, 33′)** which carries a cooling fluid to at least a portion of the associated x-ray tube, and removes heat therefrom;

a pump **(40, 40′)** which circulates the cooling fluid through the fluid flow path;

means **(52, 52′)** for determining a pressure difference across the pump; and

means **(81, 81′ , 82, 82′ , 107)** responsive to the determined pressure difference for controlling operation of the x-ray tube.

20. The system of claim 19, wherein the determining means **(52, 52′)** includes:

a means **(60, 60′)** for measuring a pressure difference across the pump **(40, 40′)**; and

a means **(80, 80′)** for determining cooling fluid flow rate from the determined pressure difference.

21. The system of claim 20, further including:

means **(90, 92)** for determining a temperature of the cooling fluid; and

the means **(81′ , 82)** for controlling also being responsive to the determined temperature.

22. The system of claim 21, further including:

a means **(120)** for selecting a scan protocol;

a means **(107)** for implementing a scan with the selected scan protocol;

the controlling means **(81, 81′ , 82, 82′)** in accordance with the determining flow rate and temperature controls at least one of:

operating power of the x-ray tube;
operating time of the x-ray tube; and
selectable scan protocols.